Subscriptions for 1939 are now due.

ENTOMOLOGICAL NEWS

MARCH, 1939

Vol. L No. 3

CONTENTS

Rau—Notes on the Behavior of Certain Social Caterpillars (Lepid.: Notodontidae, Arctiidae) 61

Vige—A New Syrphid Fly from Louisiana (Diptera). 66

Williams—The Mating and Egg-laying of Malacosoma americana (Lepid : Lasiocampidae) 69

Fox—Notes on Melinaea lilis D. & H. With the Description of a New Subspecies. (Lepidoptera: Ithomiinae). 72

Hayes—A Bibliography of Keys for the Identification of Immature Insects. Part I. Diptera. 76

Rehn—Anisoptera Schneider a Homonym (Neuroptera: Mantispidae). 82

Mutant Body Colors in a Parasitic Wasp (Hym.: Braconidae). 82

Current Entomological Literature. 83

Obituary—B. Preston Clark, Dr. Wilton Everett Britton 90

PHILADELPHIA, PA.

THE ACADEMY OF NATURAL SCIENCES,

1900 Race Street

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., V. S. L. Pate, Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows: United States and possessions, Central and South America $3.00, Canada $3.15, Foreign $3.25, Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 3 in., $ 3.00, 5 in., $ 5.00, 7 in., $ 7.00
Ten issues, " 8.00, " 25.00, " 45.00, " 60.00

SUBSCRIPTIONS. All remittances and communications regarding subscriptions, non-receipt of the "News" or of reprints, and requests for sample copies, should be addressed to
ENTOMOLOGICAL NEWS, 1900 Race Street, PHILADELPHIA, PA.

MANUSCRIPTS AND ADVERTISEMENTS should be sent to the editor, Dr. P. P. Calvert, Zoological Laboratory, University of Pennsylvania, Philadelphia, Pa.

TO CONTRIBUTORS. The receipt of all papers will be acknowledged and if they are accepted they will be published as soon as possible. If not accepted, authors will be so advised and postage requested for return of manuscripts. Articles longer than six printed pages will be published in two or more installments, unless the author is willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division. Proof will be sent to authors.

Twenty-five extras (separates) of an author's contribution will be given free when they are requested; they will be "run of form," that is without removal of extraneous matter (parts of other articles at beginning and at end), folded, but unbound, uncut and without covers. Authors wishing more than 25 separates can obtain them, at the rates given at the bottom of this page, by ordering at the time of returning proof. When more than the twenty-five free separates are ordered, ALL the extras will be free of extraneous matter.

The making of blocks and printing all **illustrations** will be charged to authors. The editor will furnish cost of same when requested.

Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1939, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December.

Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

The printer of the "News" will furnish reprints of articles, without covers, over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, $1.40; nine to twelve pages, twenty-five copies, $2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates. Printed covers for 50 copies, $4.00 or more, according to number of pages bound.

Stamps will not be accepted in payment of Reprints

ENTOMOLOGICAL NEWS

VOL. L. MARCH, 1939 No. 3

Notes on the Behavior of Certain Social Caterpillars (Lepid.: Notodontidae, Arctiidae).

By PHIL RAU, Kirkwood, Missouri.

Naturalists today, in their study of societal evolution, realize the importance of gathering behavior data on organisms that have the ear-marks of the beginnings and also of the intermediate stages of socialization. Heretofore, social life among certain Hymenoptera and other highly socially organized insects was accepted without much thought as to the origin of such socialization. With the appearance, during the last decade, of books by Wheeler[1], Alverdes[2], and Allee[3] on the origin and evolution of social life among insects, one's attention is focused on the fact that social habits in one form or other, some weak and some strong, some at one stage of organic development, some at another, appear in insect groups that heretofore were thought to be entirely solitary. Certain beetles, bugs, caterpillars, and other insects have recently attracted attention because of behaviour patterns that indicate conditions of incipient social behavior.

The lepidopterous caterpillars that show a tendency in this direction have been all but neglected; some attention has, however, been given to the problem of the different types of social and sub-social behavior in caterpillars by Harold I. O'Byrne. In his paper entitled "Gregarious caterpillars[4]," he tells us that social behavior in these organisms has arisen independently in certain species belonging to at least twenty-four of the sixty families of Lepidoptera. Most important of all, however, is the service he has rendered us in classifying this behavior. He places the gregarious habit in five distinct categories: (1)

[1] Wheeler, W. M. The Social Insects. 1928.
[2] Alverdes, F. Social Life in the Insect World. 1927.
[3] Allee, W. C. Animal Aggregations. 1931.
[4] Proc. Mo. Acad. Sci. *3*: 103-108. 1937.

those which are gregarious only in early larval life, (2) those which are gregarious in the early stages and remain so until later larval stages, (3) those which remain gregarious through the various stages until the time for hibernation and then, upon awakening, pass the balance of the larval period as solitary caterpillars, (4) those which are gregarious at birth and remain so until ready to pupate, but which become solitary before pupation, (5) those which pupate without separating. He ends his paper with a plea for the acquisition of additional data on this subject and says that since our knowledge of the utility and also the meaning of gregariousness in caterpillars is almost *nil*, a serious need is felt for observational as well as experimental work. With these needs in mind, I paid some attention to a few species of social caterpillars during the summer of 1937, and the results of those observations follow.

DATANA PERSPICUA, Gr. & Rob.[5].

In a large and sunny field at the southwest edge of Kirkwood, grow numerous sumac bushes (*Rhus glaba L.*). There were about two hundred of them, three to four feet tall, growing very close together. On three such plants, (June 30, 1937) within a space of ten square feet, I found three colonies of the caterpillars of *Datana perspicua*. They were smooth-skinned caterpillars, conspicuously colored in black and yellow; each colony was on top of the leaves in the hot sunshine. They were in a somewhat loose mass piled one on top of another. The members of each colony were of one common size indicating that all the members of each colony had emerged at about the same time from one batch of eggs. In two of the colonies the caterpillars were very large, almost full grown, and in the third colony they appeared to be but a little more than half-grown. They were brought into the laboratory and placed in a large tin-can, with earth at the bottom and sumac leaves upon which to feed. In transporting them, they were much shaken up, and were not in close proximity to each other. During the afternoon in the nearly dark laboratory, they fed revenously on the

[5] All caterpillars were identified by Mr. H. I. O'Byrne, and all plants were identified by Dr. Edgar Anderson.

leaves until every bit was consumed. When I examined them at dusk, I found that all of them had formed into one large cluster and were very quiet on the little platform of criss-cross twigs. They remained in this compact position solidly for two days, and absolutely refused to leave the mass or to consume the food that I placed in the can from time to time. When they were examined at 7 p. m., on July 3, I found that they had moulted during the past twenty hours, and whereas they were smooth-skinned caterpillars before moulting, they were now very hairy. There were many shed skins on the floor of the can. During the process of moulting they remained together in the same large mass; but when I examined them next day, I found they had disbanded and had eaten every scrap of sumac leaf in the can, which at the time was badly wilted.

The caterpillars undoubtedly are more or less solitary when feeding but come together at night and also at certain other times for the purpose of moulting. I evidently disturbed this moulting process when I transported them to the laboratory. This theory is strengthened by the discovery of another colony in the same field, on July 5; here a population of about twenty caterpillars were for the most part scattered over two low bushes in the bright sunlight. Since no single individuals could be seen elsewhere on the bushes, it is evident that the caterpillars from one mass of eggs kept close to one another (even though not piled one upon another) in order to form a mass when necessity arose[6].

By July 9, all the caterpillars had pupated either on top of or in the soft moist earth at the bottom of the can. The pupae at first were of a bright yellowish-orange color, but soon changed to a very dark brown. Their bodies were quite flexible when they were in the highly colored stage, and they would awkwardly jerk about in trying to enter the soil. The skin became hard as it darkened, and if individuals did not succeed

[6] The return to this sumac field was for the purpose of studying the population of the caterpillars, but a thorough search revealed no more than the four colonies already mentioned on about two hundred sumac plants.

in entering the earth before hardening of the skin set in, they remained on top and this without any detriment to transforming into adults. The length of time spent in the pupal stage varied from eighteen to twenty-two days, for on July 27, they were beginning to emerge from the earth as adults. The adults spent their time quietly on the twigs in the cage depositing many eggs; these hatched after a period of incubation of two to three weeks.

DATANA INTEGERRIMA, Gr. and Rob.

A large cluster of caterpillars of this species was seen on a walnut tree (*Junglans nigra*) in my garden, on August 15, 1937. They were conspicuous caterpillars with longitudinal stripes of a dull brick color, and were piled one on top of another on the under side of several leaflets. They were very quiet and did not stir, even though the twig was cut and carried into the laboratory; they were just as quiet when, later in the day, they were carried out into the sunshine for photographing. About fifty were in the cluster and had evidently congregated for the purpose of moulting, because, up to the time of my retiring at midnight, not one of them moved from its original position. For the following two days, in fact, they did not move even a little way from the original position that each one held. It was only when I pinned the leaf-stem to the tree for photographing that I noticed with the aid of bright sunlight that some few were moulting. The heads of a few were going through jerky side-to-side movements, and occasionally a complete shed skin would fall to the ground. When I examined the cluster late that night (August 17) I found them to be of a sombre color and covered with long white hairs. Almost all of them had gone through the transformation, and not one had changed its position in the mass on the leaves. In moulting, the skin, that covers the head pops off first, asd very soon after this, the caterpillar works the skin from the body, permitting it to fall. Even though most of them had moulted, they continued to remain in the same quiet position; examinations made at 9 p. m., on the day that they moulted and also at 8 the next morning, found them immobile, limp, and still clinging to-

gether. Twelve hours later, however, or about one day after they had moulted, I found my hitherto lethargic caterpillars so active that most of them escaped by wedging themselves under the glass covering of the can. Many of them sought the window through which the light was streaming, and many of them were trapped in spider-webs. I regretted the escape because I was unable to note further the gregariousness of their behavior; this much was, at least, proven clearly: that they do cluster for moulting purposes, and that they do disband later, each going its own way once the process of moulting is completed. The caterpillars were large and seemed to be full-grown after the moult.

In *D. integerrima,* the gregarious behavior continues until time for pupation, when the larvae go to the ground and pupate singly[7]. In their communal movements in the tree, each caterpillar spins a strand of silk, and in large colonies the silk trails become broad enough to support several traffic lanes. Silk spinning in this species is confined to the making of roadways, for the larvae live exposed, making no shelter at any time.

The sense of smell is evidently well developed in these caterpillars, for when they escaped from my cage many of them entered another cage some distance away that contained a jar with fresh walnut leaves. They likewise entered the cage by wdging themselves under the glass sheet on top.

HYPHANTRIA CUNEA, Drury.

I was especially on the outlook for the conspicuous tents of the fall web-worm during a trip in July, through southern Illinois to Reelfoot Lake, Tennessee, and only two such colonies were encountered; one of these was at Reelfoot Lake in a clump of about fifty pecan trees (*Carya pecan* Engl. and Graebn.). These trees were from five to seven feet in height. The other was along the roadside near Tiptonville, Tennessee, in a clump of about a dozen trees of the same species. I spent two days driving about the lake, and was indeed surprised to find only two colonies in the large area covered. The caterpillars were brought into the laboratory on July 13, where many

[7] O'Bryne, Proc. Mo. Acad. Sci. *3*: 105. 1937.

of them pupated in their tents. About five weeks later, I found that they had transformed and died within the web. *Hyphantria cunea* larvae feed inside the nest, and enlarge the nest when necessary to enclose fresh leaves.

ATTEVA PUNCTELLA FITCH.

Each year I get a rich infestation of these moths in my Ailanthus trees, (*Ailanthus altissima*). This moth spends all of its stages in the very thinly-spun nests that it makes. Silk is merely used to bind leaves together with large open spaces in between as a sort of cradle. The colonies within these aerial cradles are never large and often contain caterpillars of various sizes. In mid-August, for example, I found nests contained the following population:

Nest A. 1 large, 1 medium caterpillar.
Nest B. 1 pupa.
Nest C. 3 empty pupal cases.
Nest D. 5 caterpillars, various sizes, small to medium.
Nest E. 1 large caterpillar in a dead curled leaf.
Nest F. 1 large in a dead curled leaf.
Nest G. 2 small caterpillar, 1 pupa.
Nest H. 1 large, 1 medium, 1 small (large one curled up in leaf).
Nest I. 1 pupa, 2 large larvae.

One often finds (as shown above) the large caterpillars curled up among dead leaves which are fastened together with silk; this may be in preparation for transformation. One also often finds an adult moth in the nest, and oviposition no doubt occurs in the same aerial cradle in which the mother was born.

The caterpillars remain on the ailanthus leaves until the middle of September. The silken cradles at this time often become quite large. A little later the leaves fall to the ground, but by this time the insect is probably safely in hibernation; I do not know, however, in what stage this occurs.

A New Syrphid Fly from Louisiana (Diptera).

By L. VIGÉ, Lafayette, Louisiana.

Toxomerus jussiaeae n. sp.

This species differs from *T. geminata* Say and *T. occidentalis* Curran in that the process of the hind femur of the male arises more distally, being slightly more than half as long as the dis-

tance from its base to the trochanter, and forms a greater angle with the femur; the basal prominence is lacking; the tibiae are not broadly produced apically; the yellow of the front on each side in the female is usually shorter and always more acute superiorly; the female lacks black bands on the hind femora and tibiae; the scutellum is reddish-yellow, and there is a silvery white spot above the front coxa in both sexes.

Length —5.5 mm. to 6.5 mm.

♂. Face yellow, grayish-tinged especially laterally below the antennae and on and about the tubercle, generally covered with silvery pubescence; cheeks black behind. Antennae reddish-yellow, first and second segments with distinct black hairs, third segment ferrugineous above and apically; arista black. Vertical triangle broad, black with rusty pollen and black hairs. Pile of front light; black hairs near the base of the antennae above and laterally. Eyes between vertical and frontal triangles less approximate and for a shorter distance than in either *T. geminata* or *T. occidentalis,* a distinct shining black spot at this point. Posterior orbits gray with white pile below the emargination of eye, rusty pile above.

Thorax greenish-rusty above, median cinerous line distinct throughout, lateral cinerous lines less conspicuous, yellow lateral margins complete; pleura black, gray pollinose, yellow at caudal portion of mesopleura much broader superiorly where it joins the yellow of the anterior superior part of the pteropleura, a silvery white spot on the sternopleura just below the yellow of the mesopleura, a similar but less distinct silvery spot above the front coxa.

Legs: front and middle coxae black, yellow apically; hind coxae mainly yellow, dark basally; all trochanters yellow; first and second femora yellow basally and apically, the main portion dark or black; hind femora arcuate, yellow at base, reddish apically, the main portion dark or black; the process long, dark, more remote from the base of the femur than in *T. geminata* or *T. occidentalis,* lacks the stout base, is distinctly curved and forms a greater angle with the femur; first and second tibiae and tarsi yellow, hairs mainly black; hind tibiae dark-red, normal apically (not dilated); hind tarsus with black hairs dorsally and yellow hairs ventrally, last two segments black.

Wings hyaline; stigma brown, color continued basally between the auxiliary and the first longitudinal veins.

Abdomen predominantly reddish-yellow; first segment black above, edges narrowly yellow; second segment black, a light median fascia broadest at the edges and interrupted; third and fourth segments each with a black fascia apically, semi-interrupted, and a median, black, geminate vitta (this may be reduced to mere spots); fifth segment with anterior median and two caudal lateral black spots (these represented by a median vitta joining a caudal fascia in some specimens and by spots or a median spot only in others). Two males, evidently quite young, lack practically all the black markings.

♀. Face with a black stripe descending from the front around each antenna and tapering on either side of the tubercle to its lower level, infuscate, especially above the oral margins and bordering the eyes. Antennae as in the male, third segment more generally ferrugineous. Front broad, black, black pile; yellow as follows—a usually short, triangular, lateral marking, acute above, ascends on each side from the yellow of the face, the yellow marking usually shorter and always more pointed at the top than in either *T. geminata* or *T. occidentalis*. Posterior orbits lighter than in the male medially.

Legs more yellowish than in the male; hind femora and tibiae less arcuate than in the male and lacking the characteristic black bands of *T. geminata* and *T. occidentalis*.

Abdomenal markings as in the male except on the fifth and sixth segments, each of which has a distinct black fascia apically and usually a single, median, black vitta.

Holotype: male, Evangeline Parish, LOUISIANA, May 8, 1938. *Allotype:* female, same locality and date.

Paratypes, 25 males and 25 females, all from Lousiana as follows—Evangeline Parish (May 30, 1937, 5♂, 3♀; June 26, 2♂; July 20, 1♂, 1♀; August 28, 1♀; September 13, 3♀; April, 1938, 1♂ 1♀; April 24, 3♂, 2♀; May 8, 2♂, 2♀). St. Landry Parish (May 15, 1938, 3♂, 2♀). East Baton Rouge Parish (June 16, 1937, 2♂, 2♀; June 27, 2♀; July 3, 1♂, 2♀; July 6, 1♂, 1♀; July 26, 1♀; August 7, 4♂, 2♀).

All the specimens collected by the author. They were all associated with one weed, *Jussiaea diffusa,* which grows in ponds and ditches.

The types were collected while in copulation. They were sent to the American Museum of Natural History, New York, N. Y.

The Mating and Egg-laying of Malacosoma americana (Lepid.: Lasiocampidae).

By Joseph L. Williams, University of Pennsylvania.
and Lincoln University, Pennsylvania.

(Continued from page 50.)

Discussion.

In *Malacosoma americana,* one of our American relatives of the European *Lasiocampa quercus,* only one copulation is normal during the reproductive process. This method of copulating differs from that observed by Pictet (1931), for *Lasiocampa quercus.* He says (translated): "The male *Lasiocampa quercus* normally copulates twice with the same female. The first time is by placing himself on her left, which has the power of fertilizing the female through the vaginal orifice, then after detaching himself from her and being slightly distant from her for about twenty minutes, pairs a second time on her right in the egg-laying orifice, which has no other purpose except for causing the immediate laying of the eggs fertilized by the union on the left." Pictet stated further that the second copulation dilates the sphincter of the egg-laying orifice, for if it does not take place, the female must wait for muscular relaxation of the egg-laying orifice for five or six days, before beginning the act of egg-laying.

In *Malacosoma americana,* the penis was observed to be only in the opening leading to the bursa, which corresponds to the vaginal orifice of Pictet. This is normal for this species and is the only copulation performed by it. Mated females of *Malacosoma americana* are generally unable to lay when twigs of certain trees are absent, not because of a necessity for a second copulation. These twigs act largely as a mechanical stimulus; however, chemical stimulation is not entirely lacking, because mated females failed to lay on oak and maple. Pictet claims that females of *Lasiocampa quercus* must wait for five or six days before the act of egg-laying if the second copulation does not take place. Mated females of *Malacosoma americana* even in the presence of males died before five or six days, when twigs which act as a stimulus for egg-laying were absent.

British investigators have observed oviposition of *Lasiocampa quercus* and one of its varieties, *Lasiocampa callunoe*. Some of these agree that immediate oviposition of a fertile female occurs only after she has been on wing, which they consider to be the stimulus for this act, and that the eggs are laid loosely. Bacot (in Tutt, 1900) reports that *Lasiocampa quercus* oviposits in from ten to twenty minutes after pairing, but he makes no mention of double copulation. All agree that the virgin females of *Lasiocampa quercus* lay after they have retained their eggs for several days. In some cases it is reported that the eggs even hatch parthenogenetically (Groom 1868, Laddiman 1878, Mory 1895, Rothschild 1920, and Tutt, British Lepidoptera 1:27, 3:42, quotes also Tardy and Weir).

Virgin females of *Malacosoma americana* generally cannot lay even when twigs are present and those that lay, lay fewer than a dozen eggs. Copulation must take place before they are able to lay. One of Pictet's conclusions is as follows: "A male which has fertilized a first female can copulate with a second (virgin), but no longer has the power of fertilizing her, because he copulates with the second only on the right, and because only the union on the left has the power of fertilizing. The female lays immediately, but her eggs, it is agreed, are not fertilized." Probing with bristle and various kinds of needles into the egg-laying orifice of virgin females of *Malacosoma americana*, to take the place of such a copulation in *Lasiocampa quercus*, failed to cause these virgin females to lay.

SUMMARY.

1. The object of this work was to verify in our American relative, *Malacosoma americana*, Pictet's (1931) observation of double copulation of the European *Lasiocampa quercus*.

2. Caterpillars were allowed to feed freely until they were nearly full grown. They were then captured and raised in captivity to form cocoons. Copulating experiments were conducted upon the moths that emerged from the pupae.

3. Observations for egg-laying were made by placing mated females in half-pint milk bottles. Both mated and virgin females were placed in paste-board boxes and also tried upon

twigs of wild cherry, apple, pear, dead pear, peach, plum, maple and oak.

4. Only mated females were able to lay, but only, except in a very few cases, in the presence of twigs of rosaceous trees noted in no. 3. Oak and maple twigs induced no egg-laying.

5. Virgin females were unable to lay, probably because they did not pair. Probing the egg-laying orifice with bristles and various kinds of needles and injection of liquid expressed from the male reproductive organs to induce egg-laying, as the second copulation is said to function in *Lasiocampa quercus,* failed to make them lay.

6. Only one copulation is normal for *Malacosoma americana,* and the penis is always found in the bursal opening.

REFERENCES.

BUCKLER, WM., 1888. Larvae of British Butterflies and Moths, 3: 57. London Ray Society.

G[ROOM], C. O. 1868. Smell of Oak Egger Moth, *Science Gossip,* p. 71.

LADDIMAN, R., 1878. Notes on Bombyx quercus, *The Entomologist,* London, 11: 270-271.

LEBARON, WM., 1870. "The Apple-Tree Tent-Caterpillar," *The American Entomologist,* 2: 143-146, Figs. 97 and 98.

MORY, EUGENE, 1895. "Parthenogenesis of B. quercus," *Societas entomologica,* Zurich-Hottingen, 10: (1) p. 3.

NORRIS, M. S., 1932. "Contributions towards the Study of Insect Fertility—The Structure and Operation of the Reproductive Organs of the Genera Ephestia and Plodia (Lepidoptera, Phycitidae)," *Proceedings Zool. Soc.,* London, pp. 595-611, 5 pls.

PICTET, A., 1931 (a). "Sur le double accouplement et la double ponte de Lasiocampa quercus L. (Lépidoptères," *Rev. suisse Zool.,* Geneva, 38: 373-375.

ID., 1931 (b). "Recherches experimentales sur le double accouplement et la double ponte de Lasiocampa quercus (Lépidoptères) et sur les consequences génétiques qui en resultant," *Rev. suisse Zool.,* Geneve, 38: 449-467.

ROTHSCHILD, Lord., 1920. "A Case of Parthenogenesis in

Lasiocampa quercus, L.", *Proc. Entomol. Soc.*, London, p. liv.

SEITZ, ADALBERT, 1913. "The Macrolepidoptera of the World, Bombyces et Sphinges palaearcticae," 2: 156. Stuttgart (Alferd Kerner).

SOUTH, R., 1907. "The Moths of the British Isles," series 1, p. 118-119. Frederick Warne & Co., London.

TUTT, J. W., 1899. "The Natural History of the British Lepidoptera," London, 1: 27.

ID., 1900. "The Natural History of the British Lepidoptera," London, 2: 436.

ID., 1902. "The Natural History of the British Lepidoptera," London, 3: 42, 87.

WILLIAMS, J. L., 1938. "The Mating of Ephestia kuehniella Zeller and Its Results," *Entomological News*, 49: (4), 104-107; (5), 121-126, 2 pls.

Notes on Melinaea lilis D. & H. With the Description of a New Subspecies. (Lepidoptera: Ithomiinae).

By RICHARD M. FOX, Academy of Natural Sciences of Philadelphia.

The forms of *Melinaea lilis*, distributed from southern Mexico to Bolivia and Venezuela, exhibit strikingly the geographic variation in color and marking so frequently observed among Neotropic Lepidoptera. The various subspecies fall naturally into two categories, so unlike at first glance as to have every appearance of being separate species. However, it is characteristic of this subfamily that examples closely similar are likely to belong to different genera, while forms quite unlike may be but developments of a single species. Hence, maculation and coloring are untrustworthy if used as sole characteristics for classification. One group of subspecies of the species under consideration has on the apical portion of the primaries two rows of large yellow spots forming bands separated by a solid band of black and preceded by another black band which crosses the distal end of the cell. Two black spots,

one within the cell and one immediately below it, are sometimes long enough to form a third dark band, or nearly so. The complete pattern of the secondaries exhibits a black, curved, median band running from apex to base like a dark festoon. In contrast, the other group of subspecies, while similar on the secondaries, has the tawny ground-color of the primaries reduced to the basal third of the wing, and the post-median and subterminal light bands are a series of separated chalky-white spots. For convenience these two groups of subspecies are here called respectively the yellow-spotted and the white-spotted forms, the relationship of which was recognized by W. T. M. Forbes, who published a usable key (1). Forbes' grouping was sustained in Bryk's catalogue (2).

Distributional considerations led both Forbes (1) and Godman and Salvin (3) to suggest that Salvin's *scylax* (4) may be a geographic race of *lilis*, but for present purposes *scylax* is recognized as separate.

MELINAEA LILIS PARALLELIS Butler

Melinaea parallelis Butler, Cist. Ent., i, p. 155 (1873)

With the median band of the secondaries complete, and the white markings of the primaries tending to be smaller than those of the next subspecies, this is the Central American representative of the white-spotted forms, being found in Panama.

MELINAEA LILIS MESSATIS (Hewitson)

Mechanitis messatis Hewitson, Exot. Butt., i, Mechanitis 4; pl. 9, fig. 4 (1855)

The median band of the secondaries is obsolete proximally in this Colombian subspecies. It is interesting to note that the Central American forms bear a greater emphasis on black than do the South American counterparts, respectively, yellow- and white-spotted. If *scylax* is admitted as a *lilis* form, its immaculate secondaries and general tendency toward emphasis on the lighter areas would pose a serious zoogeographic problem.

Forbes indicated his disappointment with the genitalia for determining species of this genus, he regarded the slight variation as possibly individual only (5). With *messatis* and *parallelis* agreeing with *lilis* in anatomic respects, and with the un-

mistakable, though curiously varied, *lilis* pattern present on the wings, it is necessary to accept Forbes' grouping of "perhaps too miscellaneous a series of forms" (6) as being correct.

MELINAEA LILIS DODONA Hopffer

Melinaea dodona Hopffer, Ent. Zeit. Stettin, xxxv, p. 344 (1874)

Lacking examples for study, judgment is here based on the literature. Apparently *dodona* represents a connecting link between the yellow- and the white-spotted forms. In pattern it resembles *parallelis*, but only the marginal series of dots is white, the others being yellow. It is found in Bolivia, to the south of any other *lilis* form.

MELINAEA LILIS IMITATA Bates

Melinaea imitata Bates, Ent. Mo. Mag., i, p. 55 (1864)

Distributed from southern Mexico to Costa Rica, this never has been recorded from as far south as Panama. It is yellow-spotted, but the black markings are more pronounced than in the nymotypic subspecies, and the post-median light band is tawny toward the distal margin, the two median spots nearly joined into a band.

MELINAEA LILIS LILIS (D. & H.)

Mechanitis lilis Doubleday, Hewitson and Westwood, Gen. Diurn. Lep., p. 130; pl. 17, fig. 4 (1847)

The post-median band is of clear yellow, the median band of the secondaries is complete. This subspecies is found in Venezuela and Colombia, the northerly record being Lion Hill, Panama (3). The area in northern Panama between the southern range of *imitata* and the northern limit of *lilis lilis* is neatly filled by *scylax*.

MELINAEA LILIS **ezra** new subspecies

In every respect, except the maculation of the primaries, this agrees with *lilis lilis*.

On the primaries dorsally the marginal dots are white, two larger ones being located at the apex with a smaller one below them, and two additional pairs, respectively between M_3 and Cu_1, and between Cu_1 and Cu_2. These last dots are small or vestigial and enclosed in black marginal triangles which in *lilis lilis* constitute the termini of the two dark bands. The light

sub-terminal band is composed of four yellow spots, each of which is margined with a narrow ring, not always complete, of tawny ground color. The post-median band is composed of a series of yellow angular spots more or less rimmed with tawny. The band separating these two yellow bands is not continuously black from costal to distal margins as in *lilis lilis*, but before reaching the marginal black triangle the black of the band irregularly fades into tawny so that the distal spots in the light bands are separated only by the ground color. The black median band ends at Cu_1, being replaced to the triangle by tawny. (In the male (type) the median band is continued by a faint thread-like streak along Cu_1, while in the female (paratype) by a similarly faint line toward Cu_2. If both of these streaks were on the same wing, they would form the outline of the continuation of the median band in *lilis lilis*.) There is yellow scaling at the anal angle and in the cell costally on the tawny sub-median area. The back spot in the cell and the one between Cu_1 and Cu_2 are as in *lilis lilis*.

Ventrally the primaries repeat the maculation of the dorsal face, exhibiting the same tendency for tawny to replace the black of the two dark bands and to encircle the yellow spots. The marginal white dots are stronger and the yellow spot in the anal angle more clearly defined than dorsally.

This form is affectionately named for Ezra T. Cresson Jr., who has fostered a whole generation of young Philadelphia entomologists.

Type. Male. "Minca, Magdalena, COLOMBIA, 2500 ft., July 24-25, 1920" (J. A. G. Rehn) (A. N. S. P., No. 7782).

One *paratype.* Female. "Hacienda Victoria, Sierra San Lorenzo, Magdalena, Colombia, 4100-4500 ft., July 23, 1920" (J. A. G. Rehn).

At present it is not clear to me whether this is an aberration accidently captured in the same general locality on two successive days, or whether *ezra* is a local race, possibly found along the lower Magdalena valley. Seasonal variation is a third possibility. A larger series of *lilis* forms from the region is essential before these questions can be answered with finality. However, two facts favor a decision that a subspecies is under consideration. First, *ezra* in macular development is consistent with the observation that the southerly *lilis* forms tend to be lighter than the northerly ones. Second, Mr. Rehn, who col-

lected both examples, was primarily interested in Orthoptera and made no special effort to gather a representative butterfly collection, but rather a sampling, during his Colombian trip. This pushes into the realm of extreme coincidence the theory that *ezra* is an aberration.

REFERENCES.

(1) FORBES, Jour. N. Y. Ent. Soc., xxxv, p. 29 (1927).
(2) BRYK, Lep. Cat., lxxx, pp. 472-474 (1937).
(3) GODMAN and SALVIN, Biol. Cent. Am., Rhop. i, p. 13 (1879).
(4) SALVIN, Ann. Mag. N. H., (ser. 4) vii, p. 412 (1871).
(5) FORBES, (op. cit.,) p. 24.
(6) FORBES, (op. cit.,) p. 28.

A Bibliography of Keys for the Identification of Immature Insects. Part I. Diptera.

By WM. P. HAYES, University of Illinois.

(Continued from page 10.)

CULICIDAE (continued).

KOMP, W. H. W. 1935. A key for the identification of the common mosquitoes of the southeastern United States. Reprint 836 from the *U. S. Public Health Repts.,* Vol. 38, No. 20, pp. 1061-1080. Revised 1935 (pp. 7-21.) (Key to larvae, p. 21; reprint is separately paged.)

ID. 1937. The species of the subgenus Kerteszia of Anopheles. *Ann. Ent. Soc. Amer.,* 30:492-529. (Key to larvae (species), p. 519.)

LI, F. and S. WU. 1934. The classification of mature larvae of Chinese anopheline mosquitoes. In: *Entom. and Phytopath.,* 2:61-66 and 81-100. (In Chinese.) (Keys and a long bibliography.)

MAIL, G. A. 1934. Mosquitoes of Montana. *Mont. Agr. Exp. Sta., Bull.* 288:1-72. (Key to Montana larvae, p. 16.)

MARTINI, E. 1929-1931. Culicidae. In: *Lindner, Die Fliegen der Palaearktischen region.* Berlin, parts 11 and 12, pp. 1-398. (Various keys in Lieferungen 33, 35, 38, 46, 48 and 53.)

ID. 1923. Lehrbuch der medizinischen Entomologie. Fischer-Jena, 462 pp. (Key to larvae, p. 150.)

MATHESON, R. 1932. A handbook of the mosquitoes of North America. Thomas and Co., Springfield, Ill. (Many keys to larvae.)

MATHESON, R., and R. C. SHANNON. 1923. The anophelines of northeastern America. *Insec. Inscit. Menst.* 11: 57-72. (Keys to larvae, p. 58.)

MEILLON, B. 1931. Illustrated keys to the full-grown larvae and adults of South African anopheline mosquitoes. *Publ. So. Africa, Inst. Med. Res.* No. 28, Vol. 4, pp. 273-375.

MITCHELL, E. G. 1906. On the known larvae of the genus Uranotaenia. *Jour. N. Y. Ent. Soc.,* 14: 8-9. (Key to three species, pp. 8-9.)

ID. 1907. Mosquito life. Putnam and Sons, N. Y., 281 pp. (Key to eggs, larvae and pupae, pp. 216-258.)

PAINE, R. W. 1935. An introduction to the mosquitoes of Fiji. Fiji Dept. Agr. 1935, 29 pp. (Keys to larvae.)

PATTON, W. S. and F. W. CRAGG. 1913. A textbook of Medical Entomology. Christian Literature Soc. for India, etc., Calcutta, 768 pp. (This is James and Liston's key to larvae of Indian Anopheles, pp. 204-205.)

PEUS, F. 1934. Zur Kenntnis der Larven und Puppen der Chaobrinae (Corethrinae auct.) *Arch. Hydrobiol.* 27: 641-668. (Key to species of larvae, pp. 645-646, but no pupal key.)

PIERCE, W. D. and C. T. GREENE. 1921. American disease carrying larvae. In: Sanitary Entomology, Badger Pub. Co., Boston, 518 pp. (Key to larval *Anopheles,* p. 272.)

PURI, I. M. 1930. Synoptic tables for the identification of the full-grown larvae of the Indian anopheline mosquitoes. *Health Bull.* No. 16, 65 pp. Govt. India, Calcutta. (Paper not seen.)

ID. 1931. Larvae of anopheline mosquitoes with full descriptions of those of the Indian species. *Ind. Med. Res. Mem.,* Vol. 21, pp. 1-227, 47 pl. (Keys to full grown larvae, pp. 67-82.)

ID. 1935. Schematic tables for the identification of the Indian anopheles. Part I, adults. Part II, full grown larvae. *Rec. Malar Surv. Ind.,* Calcutta, 5: 265-268 and 269-273. (Key to full grown larvae.)

ID. 1935. Synoptic tables for the identification of the full-grown larvae of the Indian anopheline mosquitoes. *Health Bull. Delhi, No.* 16, 69 pp.

RODENWALT, E. 1928. Kaart en determineertable van de larven der Anophelinen van Ned. Ost. Indie. *Dienst. der Volksgezondheid, Batavia.* (Paper not seen.)

ROOT, F. M. 1922. The larvae of American Anopheles mosquitoes in relation to classification and identification. *Amer. Jour. Hygiene,* 2: 379-393.

RUSSELL, P. F. 1925. Identification of larvae of three common anopheline mosquitoes of the southern United States. *Amer. Jour. Hygiene*, 5:149-174. (Keys from Howard, Dyar and Knab, pp. 150-151.)

SEGUY, M. E. 1923. Histoire naturelle des mostiques des France. Lechevalier, Paris, 225 pp., 205 figs. (Keys to larvae, p. 14.)

SMITH, J. B. 1904. Mosquitoes occurring within the state, etc. *Rept. N. J. Agr. Exp. Sta.*, 1904, 482 pp. (Key to larvae, p. 154.)

STANTON, A. T. 1916. The larvae of Malayan Anopheles. *Bull. Ent. Res.*, 6:159-172. (Key to mature larvae, p. 162.)

STEPHENS, J. W. W. and S. R. CHRISTOPHERS. 1908. The practical study of malaria. Univ. Press, Liverpool. (Characters of Anopheles eggs, p. 188, and tables of larvae, p. 202.)

STOREY, G. 1919. Keys for the determination of Egyptian mosquitoes and their larvae. *Bull. Soc. Ent. Egypte*, Cairo, 1918 (1919), pp. 84-106.

THEODOR, O. 1924. Pupae of some Palestinian culicines. *Bull. Ent. Res.*, 14:341-345. (Key to species of pupae, p. 345.)

WESCHE, W. 1910. On the larval and pupal stages of West African Culicidae. *Bull. Ent. Res.*, 1:7-50. (Keys to larvae 16-18 and pupae pp. 18-19.)

CECIDOMYIIDAE.

KIEFFER, J. J. 1913. Cecidomyiidae. *Genera Insectorum*, fasc. 152, pp. 7-13. (Summary of larval and pupal habits and characters of the family,—no key.)

FELT, E. P. The *Jour. Econ. Ent.*, Vol. 4, 1911, gives a host list of American gall midges, and the *Ann. Ent. Soc. Amer.*, Vol. 4, 1911, a summary of food habits. See also his key to American insect galls, *N. Y. State Mus. Bull.* 200, 1917.

STRATIOMYIIDAE.

BRAUER, F. 1883. (See reference cited in general keys.)

GRÜNBERG, K. 1910. (See reference in general keys.)

JOHANNSEN, O. A. 1922. Stratiomyiid larvae and puparia of the northeastern states. *Jour. N. Y. Ent. Soc.* 30:141-153. (Larval key, p. 142.)

ID. 1935. (See reference in general keys.)

LENZ, F. 1923. Stratiomyiden aus Quellen. Ein Beitrag zur Metamorphose der Stratiomyiden. *Archiv. Naturges*, Vol. 89, Abt. A. Heft 2, pp. 39-62. (Key to *Oxycera* species, pp. 46-47; to *Nemoletus*, p. 55, and *Beris*, pp. 58-59.)

ID. 1926. Stratiomyiden Larven aus dem Salzwasser. *Mitt.*

Geog. Ges., Lübeck, 31: 170-175 (2nd series). (Key to species of *Oxycera*, pp. 173-174.)

LUNDBECK, W. 1907. Diptera Danica, Genera and Species of Flies Hitherto Found in Denmark. Part I. G. E. C. Gac, Copenhagen, 166 pp. (Key to several genera and species of Danish Stratomyiinae, pp. 74-75.)

SHARP, D. 1909. Stratiomyiidae and succeeding families of the Diptera Brachycera. In: *Verral, British Flies*, Vol. 5, Guerney and Jackson, London. (Key to genera of larvae, pp. 33-34.)

SEGUY, E. 1926. (See p. 18 of reference in general keys. This is Lundbeck's key cited above.)

(See also HART, 1905, p. 248, cited in general keys.)

TABANIDAE.

PHILIP, C. B. 1931. The Tabanidae (horseflies) of Minnesota, with special reference to their biologies and taxonomy. *Minn. Agr. Exp. Sta., Tech. Bul.* 80, 132 pp. (Various keys to eggs, larvae and pupae.)

STAMMER, H. J. 1924. Die Larven der Tabaniden. *Ztschr. Morph. und Ökol. Tiere.* 1: 121-170. (Larval key to European genera, p. 130; to species of *Tabanus*, p. 132.)

SEGAL, G. 1936. Synopsis of the Tabanidae of New York, their biology and taxonomy, I. The genus *Chrysops.* Meigen. *Jour. N. Y. Ent. Soc.*, 44: 51-78 and 125-154. (Key to eggs, larvae and pupae, p. 71; egg key is after Hart, 1895.)

STONE, A. 1930. The bionomics of some Tabanidae. *Ann. Ent. Soc. Amer.*, 23: 261-304. (Generic key to eggs, larvae and pupa, p. 272; key to species of *Chrysops*, p. 273.)

(See also BELING, 1882; HART, 1895; MALLOCH, 1917; and JOHANNSEN, 1935; cited in general keys.)

RHAGIONIDAE (LEPTIDAE).

GREENE, C. T. 1926. Description of larvae and pupae of the two-winged flies belonging to the family Leptidae. *Proc. U. S. Nat'l. Mus.*, 70: 1-20, 3 pls. (Key to larvae, pp. 2-3; pupae, pp. 3-4.)

(See also BELING, p. 236; cited in general keys.)

DOLICHOPODIDAE, EMPIDIDAE, ASILIDAE, BOMBYLIIDAE, and THEREVIDAE.

(See MALLOCH, 1915, in general keys, for key to pupae; and BELING, T., 1882; in general keys.)

SYRPHIDAE.

FLUKE, C. D. 1929. The known predaceous and parasitic enemies of the pea aphid in North America. *Wis. Agr. Exp.*

Sta., Bull. 93, pp. 1-47. (Key to larvae, pp. 15-17.)

(See also BELING, 1882; cited in general keys.)

HEISS, E. M. 1938. A classification of the larvae and puparia of the Syrphidae of Illinois, exclusive of aquatic forms. *Illinois Biol. Monog.*, 36: 1-142. (Key to genera of larvae and genera of puparia.)

METCALF, C. L. 1913. Syrphidae of Ohio. *Ohio. Biol. Survey, Bull.* 1. *Ohio State Univ. Bull.*, Vol. 17 (31), pp. 1-122. (Key to larvae and pupae, p. 52.)

ID. 1916. Syrphidae of Maine. *Maine Agr. Exp. Sta., Bull.* 253, pp. 193-264. (Keys to larvae and pupae, pp. 256-258.)

ID. 1933. An obscure *Temnostoma* differentiated by its larval characters (Syrphidae: Diptera). *Ann. Ent. Soc. Amer.*, 26: 1-8. (A tabular larval key to two species of this genus, p. 5.)

VIMMER, A. 1933. [Keys to larvae and pupae of Czechoslovakian Syrphidae.] *Casopsis* (*Acta Soc. Ent. Czh.*), Vol. 30, pp. 181-187.

CONOPIDAE.

TOWNSEND, L. H. 1935. The mature larva and puparium of *Physocephala sagitarria* (Say) (Diptera, Conopidae), *Psyche*, 42: 142-148. (Larval key to three genera, p. 147.)

TRUPANEIDAE (TRYPETIDAE).

GREENE, C. T. 1929. Characters of the larvae and pupae of certain fruit flies. *Jour. Agr. Res.*, 38: 489-504. (Key to larvae and pupae, pp. 490-491.)

AGROMYZIDAE.

(See FROST, in general keys, pp. 37-38; and NEEDHAM, FROST and TOTHILL, p. 239.)

MYIASIS PRODUCING DIPTERA.

(Mostly Cyclorrhapha.)

GREENE, C. T. 1921. Table to separate common larvae (maggots) Diptera. In: Pierce, Sanitary Entomology, Badger Publ. Co., Boston. (Larval key, pp. 142-144. This key also occurs in the Mimeographed edition of the U. S. Bur. Ent., Proceedings of the class to study entomology of disease, hygiene and sanitation, 1918, p. 217.)

ISAACS, I. M. 1923. Key to the identification of larvae of the dipterous families and certain subgroups . . . relating to myiasis. In: Herms, Medical and Veterinary Entomology, MacMillan Co., N. Y. (Larval key, p. 315.)

LAAKE, E. W., E. C. CUSHING and H. E. PARISH. 1936. Biology of the primary screw worm *Cochliomyia americana*

and a comparison of its stages with those of *C. macellaria*. *U. S. D. A., Tech. Bull.* 500. 24 pp. (Tabular differentiation of instars of these two species, pp. 13-14.)

PATTON, W. S. 1921. Notes on the myiasis-producing Diptera of man and animals. *Bull. Ent. Res.*, 12: 239-261. (Larval key, p. 258.)

ID. 1923. Identification of larvae of the Diptera which cause naso-pharyngeal and aural myiasis in man. *Jour. Laryn. and Otol.* 38: 18. (Paper not seen.)

RILEY, W. A. and O. A. JOHANNSEN. 1915. [Dipterous larva causing myiasis.] In: Handbook of Medical Entomology, Comstock Pub. Co., Ithaca, N. Y. (Key to larvae, pp. 136-137.)

ID. 1932. [Myiasis-producing Diptera.] (In: Medical Entomology, McGraw-Hill Co., New York.) (Larval key to families and some genera of aquatic dipterous larvae pp. 194-195 and myiasis-producing genera, based in part on Tao (1927) with keys to all instars pp. 370-376.)

TAO, S. M. 1927. A comparative study of the early larval stages of some common flies. *Amer. Jour. Hygiene*, 7: 735-761. (Larval key to families of first and second instars, pp. 746-747.)

MUSCIDAE, TACHINIDAE and METOPIDAE (= SARCOPHAGIDAE).

GREENE, C. T. 1921. An illustrated synopsis of the puparia of 100 muscoid flies (Diptera). *Proc. U. S. Nat. Mus.* 60: 1-39. (Mostly on Tachinidae.)

ID. 1925. A tentative arrangement of muscoid flies based on the puparia. *Proc. Ent. Soc. Wash.*, 27: 157-163. (A tabulation of characters and pictorial key, p. 10.)

ID. 1925. The puparia and larvae of sarcophagid flies. *Proc. U. S. Nat. Mus.*, 66: 1-26. (Larval key to five species and a long key to puparia.)

OESTRIDAE AND GASTROPHILIDAE.

DOVE, W. E. 1918. Some biological and control studies of *Gastrophilus haemorrhoidalis* and other bots of horses. *U. S. D. A., Bull.* 597, p. 1-51. (Key to larvae, p. 4.)

LUNDBECK, W. 1927. In: Diptera Danica. Vol. 7. G. E. C. Gad, Copenhagen, 558 pp. (Larval key to species of Gastrophilus, p. 79.)

PATTON, W. S. and F. W. CRAGG. 1913. A textbook of medical entomology. Christian Literature Soc. for India, etc. Calcutta, 768 pp. (This is Williston's key to genera of larvae, pp. 317-318.)

SHANNON, R. C. 1922. The bot flies of domestic animals.

Cornell Veterinarian, July 1922, pp. 240-262. (Larvae of horse bots, pp. 261-262.)

RODHAIN, J. et J. BEQUAERT. 1916. Materiaux pour une etude monographique des Dipteres parasites de l'Afrique. Part II. Revision des Oestrinae. *Bull. Scient. France et Belg.*, (7th Ser.) 50: 53-162. (Larval key to genera, pp. 67-68.)

WILLISTON, S. W. 1908. Manual of North American Diptera (3 ed.). Hathaway, New Haven, Conn. 405 pp. (Larval key to genera, p. 347.)

(See also BRAUER, 1883, pp. 36-38, and keys to myiasis- producing Diptera, such as those in RILEY AND JOHANNSEN, 1932.)

Anisoptera Schneider a Homonym (Neuroptera: Mantispidae).

The family Mantispidae is usually divided into a number of subfamilies by present workers and it is unfortunate that one of these is based on *Anisoptera* Schneider[1] which is a homonym of *Anisoptera* Berthold.[2] As a result, the former must be replaced and I propose *Platymantispa* as a new genus with *Mantispa notha* Erichson [=*Anisoptera notha* (Erichson)] as its genotype. Therefore, the portion of the family called the Anisopterinae by Enderlein[3] in his revision of the genera must now be known as the Platymantispinae.[4]

JOHN W. H. REHN, Philadelphia, Pennsylvania.

Mutant Body Colors in a Parasitic Wasp (Hym.: Braconidae).

Wild type individuals of the wasp, *Habrobracon juglandis* (Ashm.), vary from honey yellow to almost black, due primarily to temperature, higher producing more yellow, lower more black, but races under constant temperature may differ consistently in pigmentation. Dr. Anna R. Whiting describes and illustrates in color results of rearing wild and mutant body color types in Proceedings, American Philosophical Society, vol. 80, no. 1, Jan., 1939.

[1] 1843. Monograph Gen. Rhaphidia, p. 32.
[2] 1827. In Latreille, Fam. Thierr., p. 409.
[3] 1910. Stett, Ent. Zeit., 71, p. 342.
[4] *Mantispa notha* Erichson is the genotype of *Anisoptera* Schneider (by designation of Enderlein, 1910) and the genotype of *Platymantispa* (by present designation) and the two genera are as a consequence isogenotypic.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Allen, N.—Some applications of mathematics to an insect life-history study. [12] 31:719-722, ill. **Anslijn, N., Nicolaas.**—Obituary by D. MacGillavry. [58] 10:87-88. **Barnes, H. F.**—Recent advances in Science: Entomology. [Science Progress] 33:549-556. **Creighton, J. T.**—Factors influencing insect abundance. [12] 31:735-739. **Curran, C. H.**—On eating insects. [Natural History, N. Y.] 43:84-89. **Daniels, J.**—The dedication of Mexico's Leland Ossian Howard Entomological Laboratory. [12] 31:773-775. **Darlington, P. J.**—Experiments on mimicry in Cuba, with suggestions for future study. [36] 87:681-708, ill. **Derenne, F.**—Professeur Dr. Embrik Strand: Volumes jubulaires III et IV. [Lambillionea] 1938:198-200. **Felt, E. P.**—The literature of American Economic Entomology. [12] 31:353-356. Wind drift and dissemination of insects. [4] 70:221-224. **Flint & Bigger.**—Biological control of insects through plant resistance. [4] 70:244-246. **Gaines & Ewing.**—The relation of wind currents, as indicated by balloon drifts, to cotton flea hopper dispersal. [12] 31:674-677, ill. **Ginsburg, I.**—Arithmetical definition of the species, subspecies and race concept, with a proposal for a modified nomenclature. [Zoologica] 23:253-286, ill. **Harris, K. L.**—Soil conservation versus insect control. [10] 41:20-26. **Hayes & DeCoursey.**—(See Orthoptera.) **Heberdey, R. F.**—Das Herstellen mikropischer Praparate. [79] 24:224-233, ill. **Kennedy, C. H.**—The present status of work on the

ecology of aquatic insects as shown by the work on the Odonata. [43] 38:267-276. **Miller, H.**—The genus and species in relation to evolution and to system. [90] 73:93-95. **Patch, E. M.**—Tour to the Entomological Congress [12] 31:775-777. **Rodeck, H. G.**—Type specimens of fossils in the University of Colorado Museum. [Univ. Col. Studies] 25:281-304. **Ronna, A.**—Animaes inimigos da Abelha domestica e de seus procuctos. [Rev. D.N.P.A., Rio de Janeiro] 1937:1-39, ill. **Strong, L. A.**—What is entomology? [Smiths. Report] Publ. 3467:377-383, ill. **Weber, H.**—Grundriss der Insektenkunde. Jena, Gustav Fischer, xii + 258 pp., ill.

ANATOMY, PHYSIOLOGY, ETC.—Ander, K.—Eine neue auffassung uber die tracheisation des insektenflugels. [Opuscula Ent.] 3:83-90, ill. **Beadle, Tatum & Clancy.**—Food level in relation to rate of development and eye pigmentation in Drosophila melanogaster. [92] 75:447-462. **Brightwell, S. T. B.**—A method for investigating membrane permeability. [22] 29:391-403, ill. **Brindley, M. D.**—The metathoracic postcoxal bridge of Heteroptera. [107] A, 13:103-106, ill. **Bruce, W. G.**—Soil moisture and its relation to the mortality of Hypoderma pupae. [12] 31:639-642, ill. **Bryk, F.**—Combinaison du doublement des ailes avec formation d'ailes jumelles chez Perisomena (Lep. Saturniid.). [Lambillionea] 1939:5-7, ill. **Chaboussou, F.**—Un cas de coaptation sexuelle chex Lebia grandis. [Rev. Francaise d'Ent.] 5:57-64, ill. **Cockayne, E. A.**—Supernumerary antennae in insects. [36] 87:385-396, ill. **Crowson, R. A.**—The metendosternite in Coleoptera: a comparative study. [36] 397-416, ill. **Deonier, C. C.**—Effects of some common poisons in sucrose solutions on the chemoreceptors of the housefly, Musca domestica. [12] 31:742-745. **Evans, A. C.**—Studies on the distribution of nitrogen in insects. II.—A note on the estimation and some properties of insect cuticle. [107] A, 13:107-110. **Favrelle, M.**—Etude du Phalces longiscaphus (Orth.: Phasmid.). [24] 107:197-211, ill. **Fraenkel, G.**—The evagination of the head in the pupae of Cyclorraphous flies. [107] A, 13:137-139, ill. **Fraenkel & Harrison.**—Irregular abdomina in Calliphora erythrocephala (Dipt.). [107] A, 13:95-96, ill. **Greenshields, F.**—Whiting's Hypothesis and Pteromalus; a critique of Dozovcera's (1936) study. [90] 73:89-91. **Harris, C. S.**—The anatomy and histology of the alimentary system of the harlequin cab-

bage bug, Murgantia histrionica (Pentatom.). [43] 38: 316-331, ill. **Hawkins, C. N.**—Insect Teratology. [107] A, 13: 92-94, ill. **Jannone, G.**—Osservazioni sulla presenza, struttura e funzione d'una vesicola ghiandolare confinata nel protorace delle specie mediterranee del gen. Acrotylus, con particolare riguardo all'A. insubricus (Orth. Acridioid.). [R. Lab. Ent. Agrar. Portici] 1938: 41-62, ill. **Khouvine, Ephrussi & Chevais.**—Development of eye-colors in Drosophila: nature of the diffusible substance; effects of yeast, peptones and starvation on their production. [92] 75: 425-446. **Koch, A.**—Symbiosenstudien, III: Die intrazelluare Bakterien-Symbiose von Mastotermes darwiniensis (Isoptera). [46] 34: 584-609, ill. **Korner & Zarapkin.**—Uber Gerichtete Variabilitat, VIII: Die Farbungsvariation bei Bombus lapponicus F.-weinchen. [46] 34: 739-752, ill. **Krause, G.**—Die Ausbildung der Korpergrundgestalt im Ei der Gewachshausschrecke, Tachycines asynamorus. [46] 34: 499-564, ill. **Lawson, C. A.**—Order of differentiation in relation to order of determination in gamic female Aphids (Homoptera). [90] 73: 69-82, ill. **Lucchese, E.**—Contributo alla conoscenza della Leskia aurea (Dipt. Larvaevorid: Dexiinae). [R. Lab. Ent. Agrar., Portici] 1938: 39 pp., ill. **Mather & Dobzhansky.**—Morphological differences between the "races" of Drosophila pseudoobscura (Diptera). [90] 73: 5-25. **Maulik, S.**—The correlation between colour pattern and structure in insects. [75] 3: 230-235, ill. **Potter, E.**—The internal anatomy of the larvae of Panorpa and Boreus (Mecoptera). [107] A, 13: 117-130, ill. The internal anatomy of the order Mecoptera. [36] 87: 467-502, ill. **Pradhan, S.**—Glands in the head capsule of Coccinellid beetles with a discussion of some gnathal glands. [J. Morph.] 64: 47-66, ill. **Roonwal, M. L.**—On a new law of the Bitriangular medial concentration of the cephalic appendages in the Chilopoda and the Insecta. [J. Morph.] 64: 1-8, ill. **Slifer & Uvarov.**—Brunner's organ: A structure found on the jumping legs of grasshoppers (Orthopt.). [107] A, 13: 111-115, ill. **Smith, S. G.**—Thelytokous parthenogenesis in Cephus cinctus (Hymen.): a criticism. [4] 70: 259-260. **Zarapkin, S. R.**—Ueber Gerichtete Variabilitat bei Coccinelliden. V. Die Reihenfolge der Fleckentstehung auf den Elytren der Coccinella 10-punctata in der Ontogenetischen Entwicklung. VI: Biometrische analyse der Gerichteten Variabilitat. [46] 34: 565-572; 573-584, ill. **Zeller, H.**—Blutt und Fettkorper im Flugel der Mehlmotte, Ephestia kuhniella. [46] 34: 663-738, ill.

ARACHNIDA AND MYRIOPODA.—Allen, W. E.—Observations concerning ticks. [Turtox News] 17:9-10. **Bondar, G.**—See under Coleoptera. **Jacot, A. P.**—The Geenton mites of Florida (Grossman Collection—III). [39] 21:49-57, ill., (k*). **Kaston, B. J.**—Notes on a new variety of Black Widow spider from southern Florida. [39] 21: 60-61. **Keifer, H. H.**—Eriophyid Studies II. [Bull. Dept. Agric. of California] 27:301-323, ill. Eriophyid Studies III. [Bull. Dept. Agric. of California] 28:22 pp., ill. **de Mello-Leitao, C.**—Solifugos de Argentina. [Mus. Arg. Cien. Nat.] 40:32 pp., ill. (Sk*). **Roewer, C. T.**—Opiliones aus dem Naturhistorischen museum in Stockholm. [83] 30, (B 10): 1-8. **Savory, T. H.**—Notes on the biology of harvestmen. [J. Quekett Micro. Cl.] 1:89-94.

THE SMALLER ORDERS OF INSECTS,—Banks, N.—New West Indian Neuropteroid insects [105] 9:285-304, ill. **Borror, D. J.**—Additions to the Ohio list of Dragonflies (Odonata). [43] 38:307-310. **Eastham, H.**—Movement of the gills of Ephemerid nymphs in relation to the water currents produced by them. [J. Quekett Micro. Cl.] 1:95-99. **Fraser, E. C.**—A note on the polymorphic venation of Epiophlebia superstes (Odonata) and its phylogenetic importance. [107] A, 13:155-157, ill. **Hood, J. D.**—Studies in Neotropical Thysanoptera, VIII. [105] 9:404-426 (*). **Kennedy, C. H.**—Odonata, see under General. **Lestage, J. A.**—Etudes sur la biologie des Plecopteres, Remarques critiques sur le genre Taeniopteryx (olim Nephelopteryx) et sur la differenciation des larves connues en Europe. [33] 73:439-452, ill. **Moulton, D.**—Thysanoptera from Minas Geraes, Brazil. [105] 9:374-382, (*). **Spieth, H. T.**—Taxonomic studies on Ephemerida, I: Description of new North American spp. [40] no. 1002; 11 p., ill.

ORTHOPTERA.—Favrelle, M.—See under Anatomy. **Folsom & Woke.**—The field cricket in relation to the cotton plant in Louisiana. [U. S. Dept. Agric.] Tech. Bull. 642: 28 pp., ill. **Hayes & DeCoursey.**—Observations of grasshopper parasitism in 1937. [12] 31:519-522. **Rehn, J. W. H.**—Notes on the genus Haaniella with the description of a new species (Phasmatidae). [1] 64:367-371, ill. **Slifer & Uvarov.**—See under Anatomy.

HEMIPTERA.—Beamer, R. H.—Four n. spp. of Leafhoppers and notes on two others (Cicadell.). [103] 12:26-30. Miscellaneous leafhoppers with descriptions of five n.

spp. (Cicadell.). [4] 70: 224-230, ill. **Butler, C. G.**—A further contribution to the ecology of Aleurodes brassicae. [107] A, 13: 161-172. **Caldwell, J. S.**—New Texan Fulgoridae. [43] 38: 304-306. **DeLong, D. M.**—Some n. spp. of Parabolocratus (Cicadell.). [43] 38: 301-303. The genus Phlepsius, a study of the North American spp. with special reference to the characters of the male genitalia (Cicadell.). [Lloydia] 1: 232-252, ill. (k*). Biological studies on the leafhopper Empoasca fabae as a bean pest. [U. S. Dept. Agric.] Tech. Bull. 618: 60 pp., ill. **Essig, E. O.**—Some new and little known Aphididae of California. [12] 31: 780-781. **Ferris, G. F.**—Contributions to the knowledge of the Coccoidea, VIII. Illustrations of thirteen genotypes of the Diaspididae. [Microent.] 3: 57-75, ill. Atlas of the scale insects of North America. Stanford Univ. Press. California. 1938. **Jordan & Wendt.**—Zur Biologie von Salda litoralis. [60] 99: 273-292, ill. **Morrison, H.**—Descriptions of n. spp. of Matsucoccus (Coccid.). [10] 41: 1-20.

LEPIDOPTERA.—Ainslie, C. N.—Flight of Alabama argillacea. [12] 31: 779. **Dethier, V. G.**—Notes on the early stages of some Hesperiinae. [4] 70: 255-259. **Dos Passos, C. F.**—A n. race of Basilarchia archippus from Louisiana (Nymphal.). [4] 70: 243, ill. **Dow, R.**—A new New Englander (Asterocampa celtis). [New England Nat.] no. 1: 16, ill. **Freeman, T. N.**—A n. race of Incisalia niphon, with notes on Strymon acadica (Lycaen.). [4] 70: 246-248. **Gaede, M.**—Lepidopterorum Catalogus. Pars. 88. Oecophoridae. 208 pp. **Hardy, J. E.**—Plutella maculipennis, its natural and biological control in England (Tineid.). [22] 29: 343-372, ill. **Hartig, G. F.**—Sechs neue Mikrolepidopteren. [64] 23: 88-90, ill. (S). **Hayward, K. J.**—A n. gen. & several n. spp. of Neotropical Hesperiidae. [105] 9: 370-374, ill. **Holik, O.**—J. Chr. Fabricius: Systema Glossatarum. [Lambillionea] 1938: 188-189. **McDunnough, J.**—Some apparently new Texan Euphithecias. [4] 70: 236-242, ill. **Sachse, W.**—Melanism. [Ward's Ent. Bull.] 6: 1. **Stichel, H.**—Lepidopterorum Catalogus. Pars 86. Nymphalidae I: subfam. Dioninae, Anetiinae, Apaturinae. 374 pp. **Watson, J. R.**—A remarkable flight of butterflies. [39] 21: 62. **Zikan, J. F.**—Novos Lepidopteros brasileiros da familia Hesperidae. [105] 9: 321-336, ill.

DIPTERA.—Alexander, C. P.—New or little known Tipulidae, LVI: Neotropical spp. [75] 3: 186-209. Records and descriptions of Tipulidae from tropical America. Pt. 1.

[105] 9:426-441, (*). **Bequaert, J.**—Notes on Hippoboscidae. 12: The gen. Microlynchia. [105] 9:343-349, ill. (Sk*). **Cresson, E. T., Jr.**—The Neriidae and Micropezidae of America north of Mexico. [1] 64:293-366, ill. (k*). **Cushing & Parish.**—Seasonal variation in the abundance of Cochliomyia spp., Phormia spp., and other flies in Menard Co., Tex. [12] 31:764-769. **Goddard, W. H.**—The description of the puparia of fourteen British species of Sphaeroceridae (Borboridae). [Trans. Soc. Brit. Ent.] 5:235-258, ill. (S). **Hardy, D. E.**—New Nearctic Pipunculidae. [103] 12:16-25, ill., (k). **James, M. T.**—Studies in Neotropical Stratiomyiidae. [103] 12:32-36, (k*). **Komp, W. H. W.**—Aedes leucotaeniatus, a n. sp. of Aedes allied to A. leucocelaenus; and descriptions of the male and larva of A. leucocelaenus (Culicid.). [10] 40:260-266, ill. **Komp & Kumm.**—A n. sp. of Haemagogus, mesodentatus, from Costa Rica, and a description of the larva of H. anastasionis (Culicid.). [10] 40:253-259, ill. **Mather & Dobzhansky.**—See under Anatomy. **Pinto & Almeida.**—Hypopygio normal e anomalo de Aedes (Culicelsa) taeniorhynchus (Culic.). [105] 9:282-284, ill. (S). **Ronna, A.**—Melaloncha ronnai (Phoridae) endoparasita de Apis mellifica (Abelha domestica). [Rev. D.N.P.A., Rio de Janeiro] 1937: 16 pp., ill. **Shields, S. E.**—Tennessee Valley Mosquito Collections. [12] 31:426-430. **Townsend, C. H. T.**—Manual of Myiology. Part VII. Sao Paulo, Brasil. 1938. 428 pp.

COLEOPTERA.—Benick, L.—Die Steninen Mittelamerikas (Staph.). [Mitt. Munchner Ent. Ges.] 28:247-281, (k*). **Bondar, G.**—Notas entomologicas da Bahia, III. (Acarina & Cerambycidae). [105] 9:441-449, ill. (*). **Borchmann, F.**—Neue Alleculiden aus dem Museum der Stadt Stettin. [60] 99:292-298, (Sk*). **Chaboussou F.**—(See Anat. & Phys.) **Cros, A.**—Considerations generales sur le genre Epicauta. Etude biologique sur epicauta albovittata (Meloidae). [Mem. Soc. Ent. Ital.] 16:129-144, ill. **Dahms & Kagan.**—Egg predator of the Chinch bug, Collops quadrimaculatus. [12] 31:779-780. **Darlington, P. J.**—See under General. **Denier, P.**—Notes sur quelques Meloidae du Bresil. [105] 9:336-343, ill. **Fisher, W. S.**—A new Anobiid beetle from Oregon. [10] 41:26-27. **Gebien, H.**—Katalog der Tenebrioniden. [Mitt. Munchner Ent. Ges.] 28:49-80; 283-314; 397-428. **Helfer, J. R.**—On mounting Staphylinidae. [Ward's Ent. Bull.] 6:4. **Hustache, A.**—Coleopterorum Catalogus. Pars 163. Curculionidae: Barinae. 219 pp. **Kaston & Riggs.**—On certain habits of elm bark beetles. [12] 31:467-469, ill. **Lesne, P.**

—Coleopterorum Catalogus. Pars 161. Bostrychidae. 84 pp. Sur un Nitidulide Mycetophage nouveau et sur quelques caracteres de la famille. [Rev. Francaise d'Ent.] 5: 158-168, ill. **Liebke, M.**—Miscellanea Carabidologica Americana, Pars III. [105] 9: 396-403, ill., (S*). **Lona, C.**—Coleopterorum Catalogus. Pars 162. Curculionidae: Otiorrhynchinae III. 415-600. **D'Orchymont, A.**—Contribution a l'etude des Palpicornia, XII. [33] 78: 426-438. (S*). **Paulian, R.**—Contribution a l'etude des Canthonides Americains (Lamellic.). [24] 107: 213-296, ill. (Sk*). **Pechuman, L. L.**—A preliminary study of the biology of Scolytus sulcatus. [12] 31: 537-543, ill. **Sanderson, M. W.**—A n. gen. of Scarabaeidae with descriptions and notes on Phyllophaga. [103] 12: 1-15, ill., (*). **Spaeth, F.**—Die gattung Himatidium (Cassidinae). [105] 9: 305-317, (Sk*). **Uhmann, E.**—Hispinen aus Argentinen (Chrysomel.). [105] 9: 364-370, ill. (*). **Wenzel, R. L.**—New and little known Neotropical Hetaeriomorphini (Histeridae). [105] 9: 317-321, ill. **Zarapkin, S. R.**—See under Anatomy.

HYMENOPTERA.—Benson, R. A.—On the classification of sawflies (Symphyta). [36] 87: 353-384, ill., (k*). **Dow & Hammerstrom.**—Honeybee facts. [New England Nat.] no. 1: 7-10, ill. **Kennedy, C. H.**—Solenopsis rosella, a new ant from southern Ontario. [4] 70: 232-236, ill. **Korner & Zarapkin.**—See under Anatomy. **Mickel, C. E.**—The neotropical Mutillid wasps of the genus Timulla. [36] 87: 529-680, ill., (k*). The Neotropical wasps of the genus Dimorphomutilla. [105] 9: 349-364, (k*). **Muesebeck, C. F. W.**—The gen. Dendrosoter in the United States (Bracon). [10] 40: 281-287, ill. (k*). **Ogloblin, A. A.**—Descripciones de Bethylidae y Dryinidae de las colecciones del Museo Argentino de Ciencias Naturales. [An. Mus. Arg. Cien. Nat.] 40: 35-48, ill. (*S). **Scullen, H. A.**—A review of the gen. Eucerceris (Sphecidae). [Oregon St. Monogr., Stud. in Ent.] no. 1, 80 pp., ill., (k*). **Takeuchi, K.**—A systematic study of the suborder Symphyta (Hymenoptera) of the Japanese Empire (1). [Tenthredo] 2: 173-229, ill., (k*). **Townes, H. K.**—The Nearctic spp. of Netelia (Paniscus of Authors) and a revision of the genera of the Neteliini (Ichneumon.). [Lloydia] 1: 168-263, ill., (k*). Pammegischia and Trichofoenus discarded (Aulacoid Hymen.). [4] 70: 254-255. **Travis, B. V.**—The fire ant (Solenopsis spp.) as a pest of quail. [12] 31: 649-652. **Walley, G. S.**—Notes on the genus Protarchoides (Ichneumon.). [4] 70: 230-232, (k*).

OBITUARY

B. PRESTON CLARK, a Research Associate in the Department of Insects of the Academy of Natural Sciences of Philadelphia, who died January 11, 1939, was born in Boston, October 8, 1860, and graduated from Amherst College in 1881. With an early bent for zoological study, the assumption of business responsibilities compelled him to devote most of his life to a variety of mining, smelting and manufacturing interests. However, during an exceedingly active life in these lines he was able to form the most outstanding collection of the Sphingidae, or hawk-moths, in existence, which in recent years was given to the Carnegie Museum at Pittsburgh. A Life Member of the Academy since 1917, Dr. Clark showed his interest in our institution by building up our collection of hawk-moths to the point where the number of species represented here was exceeded only by that in the collection given by him to the Carnegie Museum, placing us in as representative a position in this respect as any collection in Europe. In the last few years he further assisted the Academy by having his sphingid collectors in various parts of the world collect Orthoptera for our series.

Dr. Clark issued many important studies on the Sphingidae and by his own researches greatly broadened our knowledge of the group.

He was Consul for Haiti at Boston for many years, and also President of the Cambridge Theological Seminary, a trustee of the Massachusetts Homeopathic Hospital and Treasurer of the Massachusetts Bible Society, the Lincoln Home Association and the Newsboys' Reading Room Association.

JAMES A. G. REHN.

Dr. WILTON EVERETT BRITTON, national authority on entomological subjects and State entomologist for Connecticut since 1901, died February 15, 1939, in a hospital at New Haven, Connecticut. He was born at Marlboro, Massachusetts, September 18, 1868, was graduated from the University of New Hampshire in 1893 and took a year of graduate work at Cornell. Yale gave him the degree of Ph.D. in 1903, and New Hampshire the honorary Sc.D. in 1930. It was largely through Dr. Britton's efforts that Connecticut's shores were converted from mosquito-infested marshes into pleasant resorts.

He was the editor of a series on the Insects of Connecticut written by specialists, of which the volumes on Orthoptera, Odonata, Hemiptera and Hymenoptera have appeared. Active in the national entomological societies, he was President of the Association of Economic Entomologists in 1909.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Chrysalids of Papilio ajax and philenor, cocoons of Rothschildia orizaba and jorulla. Buy or exchange. Newark Entomological Society. Curator, Chas. Rummel, Green Village Rd., R. D. 2, Madison, New Jersey.

Have large list of Lepidoptera wants and offers. Send me yours. Carpenter, Box 1344, Hartford, Conn.

Geometers Wanted from all parts of United States and Canada, for cash or in exchange for butterflies. Noctuids or other Geometers. Edwin I. Guedet, P. O. Box 305, Napa, California.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis** or **Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

RECENT LITERATURE

PUBLISHED AND FOR SALE BY

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 RACE STREET, PHILADELPHIA, PA.

COLEOPTERA

1044.—**Robinson** (M.).—Studies in the Scarabaeidae. (64: 107-116, figs., 1938) ..... .20

1053.—**Blaisdell** (F. E.).—A study of the species of Hispinae belonging to the genus Stenopodius, with descriptions of new species (Chrysomelidae). (64: 421-447, 3 pls., 1939) ..... .60

DIPTERA

1047.—**Fisher** (E. G.).—North American fungus gnats (Mycetophilidae). (64: 195-200, pl., 1938) ..... .20

1050.—**Cresson** (E. T., Jr.).—The Neriidae and Micropezidae of America north of Mexico. (64: 293-366, 3 pls., 1938) 1.50

HYMENOPTERA

1045.—**Pate** (V. S. L.).—Studies in the Nyssonine wasps (Sphecidae). IV. New or redefined gen. of the tribe Nyssonini, with descr. of n. sps. (64: 117-190, 2 pls., 1938) 1.50

1049.—**Krombein** (K. V.).—Studies in the Tiphiidae. II. A revision of the Nearctic Myzininae (Aculeata). (64: 227-292, 1938) 1.30

1052.—**Pate** (V. S. L.).—Studies in the Pemphredonine wasps. II. Records and descriptions of new forms in the Ammoplanoid complex from the southwestern U. S. (Sphecidae). (64: 373-420, 2 pls., 1939) 1.00

ORTHOPTERA

1042.—**Rehn and Rehn.**—The post-oak locust (Dendrotettix quercus) in the eastern U. S., with notes on macropterism in the species (Acrididae). (64: 79-95, 2 pls., 1938) .45

1048.—**Rehn and Hebard.**—New genera and species of West Indian Acrididae, with notes on previously-known species. (64: 201-226, 1 pl., 1938) ..... .55

1051.—**Rhen** (J. W. H.).—Notes on the genus Haaniella, with the description of a new species (Phasmatidae). (64: 367-371, 1 pl., 1938) ..... .20

THE PAN-PACIFIC ENTOMOLOGIST

A quarterly journal of general entomology published by the Pacific Coast Entomological Society. It features insect problems of the Pacific area but is in no way confined to that region. The systematic and biological phases of entomology are stressed including articles on insect taxonomy morphology, life history, and distribution.

Subscription price $2.00 per yearly volume of about two hundred pages.

A few complete sets of the thirteen back volumes are still available at no increase in price.

Address: California Academy of Sciences
San Francisco, California

PERU

BEETLES FROM THE PRIMITIVE FOREST AND BUTTERFLIES

OF THE BEST QUALITY AND AT THE CHEAPEST PRICES

PEDRO PAPRZYCKI, SATIPO, PERU, SOUTH AMERICA

PANAMA CANAL ZONE INSECTS

Determined material by the specimen: Diurnal Lepidoptera, Sphingidae, Saturnidae, Scarabaeidae, Carabidae. Write for price list.

Undetermined material in several orders available in lots: Make offer in terms of rate per specimen.

R. M. FOX, 425 N. 20th Street, Philadelphia, Pa.

THE NATURALIST'S DIRECTORY

This handy reference volume contains the names, addresses and special subjects of study of professional and amateur naturalists in North and South America and other countries. The 1938 edition has just been published and is undoubtedly the "Who's Who" of natural sciences. If you are interested in some branch of natural history your name should be included. No charge is made for inserting your name. If you desire a copy, the price is $3.00, postpaid, from:

THE NATURALIST'S DIRECTORY, SALEM, MASS.

YOU'LL LIKE THIS PINNING EQUIPMENT

Ward's offers a complete line of equipment for easy handling of mounted specimens. The Cresson Pinning Forcep, at $6.50, is recognized as the world's finest forcep and is recommended where pinning is done regularly. The Akhurst Forcep, a bargain at $1.25, is suitable for beginners or for entomologists who do a limited amount of pinning. A handy device, too, is our pin holder, a hard wood block designed to hold readily accessible six sizes of insect pins, 30c. Your collection will look better if you use Ward's 3-hole pinning block, which will place specimens and labels at uniform heights on the pin. 40c.

WARD'S NATURAL SCIENCE ESTABLISHMENT, inc

The Frank A. Ward Foundation of Natural Science of the University of Rochester

READ WARD'S ENTOMOLOGICAL BULLETIN . . . issued monthly

300 NORTH GOODMAN STREET
ROCHESTER . . . . NEW YORK

FOR SALE

Seitz: Lepidoptera of the World, well bound and in good condition: Palearctic Lepidoptera, complete in 8 vols. (cost $130.00) $75.00. Ditto Supplement, 1 vol. $25.00. Indo-Australian Butterflies, 2 vols. ($120.00) $60.00, ditto Sphinges and Bombyces, 2 vols. ($60.00) $30.00. American Butterflies, 2 vols. ($125 00) $65.00. African Butterflies, 2 vols. $60.00 209 parts (cost $250.00) $75.00. Swynnerton and Hon. Ormsby-Gore: Tsetse Flies of East Africa, ($27.50) $12.00. Donovan: Insects of India, scarce, $12.00. Curtis: British Entomology, complete in 8 vols. ($140.00) $70.00. Trans. of Royal Entomological Society of London, ¼ cost. Meyers: Insect Singers, Cicadas, new ($5.25) $2.00. Donisthorpe: British Ants, new, ($5.25) $2.00. Ditto Guests of Ants, $2.00. Others. Postage extra. Fine Assam butterflies in papers (many Papilios) $6 00 per 100. Fine Morphos, bred Urania riphaeus at cheap rates per dozen or 100. British Lepidoptera, named: 500 species 2 cents each, 1000 do. 3 cents each, 1500 5 cents each. British Coleoptera, same rates.

A. FORD

42 Irving Road **Bournemouth, England**